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SOME NEW SUBSPECIES OF NORTH AMERICAN LYCAENIDAE (LEPID.).

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Dr. Willis J. Gertsch has called my attention to three undescribed races of North American *Lycaenidae* contained in his collection of Rhopalocera which was made when he resided in Salt Lake City, Utah and has kindly supplied me with many of the specimens making up the type series.

Polyommatus nivalis Boisduval (1869, Lep. de la Cala., 44), described from the mountains of California near the regions of snow was followed a few years later by *Lycaena ianthe* Edwards (1871, Trans. Amer. Ent. Soc. 3, 211) from Nevada. Probably the type of the former was taken in the Sierras (Sierra, Nevada, Placer or El Dorado County) and the latter near Virginia City. *Ianthe* appears to have been correctly sunk as a synonym. The type of the former is figured by Oberthur (Etudes de Lep. Comp. IX (1), Pl. 238, figs. 1955/6 and Holland (Butterfly Book, Rev. Ed. 249, Pl. 65, figs. 1, 2, and 3), figures the types of the latter.

Lycaena nivalis browni n. ssp.

(Plate II. figs. 1, 2, 3, and 4)

This new race differs from *nivalis* in the following particulars; on the upper side the males are a duller brown and show a brilliant violet reflection which, in fresh specimens, is spread over both wings and practically submerges the brown in some lights. In *nivalis* the violet reflection is less prominent and never hides the brown. The females are very melanic on the upper side, except the Washington paratype, showing only slight traces of yellow or orange except along the outer margin of the secondaries whereas in *nivalis* the orange coloring is very prominent. On the underside of the primaries of the males the color is pale straw with the usual black markings without the apical, costal and outer marginal pink shading found in *nivalis*. The secondaries have the basal area pale straw and the limbal area pale pink and the black markings are very faint or entirely obsolete while in *nivalis* almost the entire wing is pale pink and the black dots are always present. Similar differences exist in the females although the colors are deeper in both races. The new race appears to occur in Washington, Idaho, Wyoming and Utah. It is named in honor of F. Martin Brown of Colorado Springs, Colorado who is always so generous with his material.

The types and their disposition are as follows:

Holotype ♂ Snowslide Canyon, eight miles from Montpeliar, Idaho. July 10, 1929 (W. J. Gertsch) and

Allotype ♀ Same data, both in the American Museum of Natural History.

Paratypes 5 ♂ ♂ and 2 ♀ ♀, same data; 3 ♂ ♂ and 2 ♀ ♀ Moose P. O. Jackson Hole, Wyoming, July 12-18, 1929 (Dr. A. B. Klots); 1 ♂ Wallace, Idaho,

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June 13, 1936 (Otto Huellerman); 1 ♀ Menthow Valley, Washington, July 11, 1936 (J. C. Hopfinger); 2 ♂ ♂ Payson Canyon, Utah, July 3-4, 1936, 8000', 1 ♂ Bullion Canyon, Tushar Range, Piute County, Utah, Canadian zone meadow, alt. 9500' (Dr. A. B. Klots); 6 ♂ ♂, 3 ♀ ♀ Provo, Utah, June 20-July 28, 1909 (Tom Spalding); One pair each to the British Museum (Natural History), U. S. National Museum, Canadian National Collection, Paris Museum, Los Angeles Museum, Carnegie Museum and the Academy of Natural Sciences. The remaining paratypes are in the collections of Dr. Gertsch, William P. Comstock and the author.

Lycaena saepiolus Boisduval (1852, Ann. Soc. Ent. Fr. (2), 10, 297) was described from California and the type locality was subsequently fixed as the high mountains in Placer and Sierras counties by Drs. Barnes and McDunnough (Ent. Rec. 26, 199; see also Contributions, 3, 111). If *amica* Edwards (1863, Proc. Ent. Soc. Phila. 2, 80) is included as a race, as would seem proper, there have been named, thus far, three races, two female forms and three aberrations of this species. One of the aberrations, *leussleri* Gunder (1927, Can. Ent. 59, 282) may cause some confusion because the type locality, as published, is erroneous. The writer is indebted to Mr. Leussler, who has the type, for the information that the correct type locality is Cassells, Park Co., Colorado and not "Cassels, Park Co., Nebraska" as published.

Plebeius saepiolus gertschi n. ssp.

(Plate II. figs. 5, 6, 7 and 8)

The new race differs from nimotypical specimens in being much smaller—the type series averages about 22 mm. On the upper side, both sexes are very much duller, showing little blue and the females are not brown as with *saepiolus*, but resemble the males except that they are most suffused. On the lower side, the basal area of both wings in both sexes is grey, darker in the females than in the males and the black markings, although small, are distinct. Some specimens on the upper side superficially resemble *Plebeius aquilo rustica* Edwards. The new race appears to be restricted to the high mountains of southern Utah. It is named in honor of Dr. Gertsch. Dr. Comstock figures a ♀ of this new race as *saepiolus* (Butterflies of California, Pl. 54 fig. 3).

The types and their disposition are as follows:

Holotype ♂ Cedar Breaks, near Cedar City, Utah, July 6, 1931 (W. J. Gertsch) and

Allotype ♀ Same data, both in the American Museum of Natural History.

Paratypes 6 ♂ ♂ 6 ♀ ♀, same data; 4 ♂ ♂ 2 ♀ ♀ Puffer Lake, near Beaver, Utah, July 5, 1931 (W. J. Gertsch); 20 ♂ ♂, 10 ♀ ♀, Navajo Mt., San Juan Co., Utah, July 4-8, 1936 (10,000') in Coll. F. Martin Brown. One pair each to the British Museum (Natural History) U. S. National Museum, Canadian National Collection, Paris Museum, Los Angeles Museum, Carnegie Museum and The Academy of Natural Sciences. The remaining paratypes are in the collections of Dr. Gertsch and the author.

Lycaena lycea Edwards (1864, Proc. Ent. Soc. Phila., 2, 507) was described from a single male from the Rocky Mountains. The type locality has been more precisely fixed by Drs. Barnes and McDunnough as Colorado, east of the

Divide in the canyons near Denver (Contributions, 3, 114). On a recent visit to Pittsburgh the type could not be found. It is doubtful if Holland figures the type (Butterfly Book, plate 32, fig 18). Certainly the male figured on plate 65 fig. 20 is not the type as the label reads "Van. Isld.", probably meaning 'Vancouver Island' which is the type locality of *blackmorei* B. & McD. (1919, Can. Ent. 51, 92). That specimen is probably *blackmorei*. The female (fig. 21) is from southern Colorado and may be considered typical. *Rapahoe* Reakirt (1866, Proc. Ent. Soc. Phila., 6, 146) appears to be the female of *lycea* (Contributions, 3, 114). The absence of blue from some Colorado ♀ ♀ led Reakirt erroneously to believe that the specimens showing some blue were ♂ ♂.

In 1936, the writer received a small series of *Plebeius icarioides* Boisduval (1852, Ann. Soc. Ent. Fr., 21, 297) from E. Yale Dawson of Berkeley, California. These specimens were taken by him in the White Mountains, Arizona at an elevation of about 8500'. These were labeled *"lycea"* but did not very well fit into a Colorado series of that race. Recently in looking over the collection of Otto Buchholz of Westfield, New Jersey, he showed me a similar series taken in the same locality by the same collector. This appears to be a new race and since Mr. Buchholz very kindly supplied his specimens for the purpose of augmenting the type series, it is named in his honor.

Plebeius icarioides buchholzi n. ssp.

(Plate II. figs. 13, 14, 15 and 16)

The new race differs from *lycea* on the upper side of the male in that the marginal band of both wings is black, generally broader, not fuscous and the violet blue is darker. The female is darker brown and both wings are shot basally with blue which is entirely lacking from some Colorado specimens and not as extensive on others. Four of the females have an orange spot near the anal angle and in the fifth it is faintly indicated on the right secondary. On the underside of both sexes the ground color is a darker grey, the black markings are more prominent; they are present in the secondaries of all thirteen males although frequently lacking in *lycea* except at much reduced points on the costa. The submarginal row of spots are quite prominent, arrow shaped and pointed inwardly. It differs from *ardea* Edwards (1871, Trans. Amer. Ent. Soc. 3, 209), the Great Basin race, in that both sexes show a deeper blue and are heavily marked on the underside, especially on the secondaries.

The types and their disposition are as follows:

Holotype ♂ White Mountains, Arizona (8500') June 25, 1937 (E. Yale Dawson) and

Allotype ♀ Same data, both in the American Museum of Natural History.

Paratypes 4 ♂ ♂ 2 ♀ ♀ **same data** and 7 ♂ ♂ and 3 ♀ ♀ same locality, June 28, 1936 (E. Yale Dawson).

One pair each to the British Museum (Natural History) U. S. National Museum, Canadian National Collection, Paris Museum, Los Angeles Museum and 1 ♂ each to the Carnegie Museum and The Academy of Natural Sciences. The remaining paratypes are in the collections of Mr. Buchholz and the author.

The Rocky Mountain race of *Plebeius acmon* Westwood & Hewitson (1852, Gen. Di. Lep. Pl. 76, fig. 2) shows, as might be expected, certain pecu-

liarities which distinguish it from the Californian races. This race is named in honor of Dr. Frank E. Lutz.

Plebeius acmon lutzi n. ssp.

Plate II. figs. 9, 10, 11 and 12)

This new race differs from all others in that, beside being considerably larger, (the type series averages about 26 mm., the ♀ ♀ being slightly larger than the ♂ ♂), the males on the upper side are usually dark greyish blue and the females brown with a bluish reflexion. The marginal line on the upper side of the primaries is broader and the orange submarginal band of the secondaries is broad. On the underside of both sexes the ground color of the primaries is uniformly grey whereas in *acmon* this color is lighter at the outer margin. The basal area of the secondaries is darker, the black markings are quadrate and distinct. The underside of the left secondary of the holotype is slightly aberrant.

The types and their disposition are as follows:

Holotype ♂ Snowslide Canyon, eight miles from Montpelier, Idaho, July 10, 1929 (W. J. Gertsch) and

Allotype ♀ Same data, both in the American Museum of Natural History.

Paratypes 2 ♂ ♂ 3 ♀ ♀ same data; 1 ♂ Dry Canyon, Salt Lake City, Utah, July 10, 1929 and 1 ♀ City Creek, Salt Lake City, Utah June 27, 1928 (W. J. Gertsch); 1 ♂ 3 ♀ ♀ Mooose P. O. Jackson Hole, Wyoming, July 12-16, 1929 6700′ (Dr. A. B. Klots); 1 ♂ Wyoming Peak, Wyoming Range, Wyoming, August 9, 1935 Hudsonian zone meadow 10,000′ (Dr. A. B. Klots) and 5 ♀ ♀ Camp Roosevelt, Yellowstone Park (Wyoming) no date.

One pair each to the British Museum (Natural History) U. S. National Museum, Canadian National Collection, Paris Museum and Los Angeles Museum, one ♀ paratype each to the Carnegie Museum and The Academy of Natural Sciences. The remaining paratypes are in the collections of Dr. Gertsch and the author.

EXPLANATION OF PLATE II.

Figs. 1-4 *L. nivalis browni* n. ssp., holotype and allotype, upper and undersides.
Figs. 5-8 *P. saepiolus gertschi* n. ssp., holotype and allotype, upper and undersides.
Figs. 9-12 *P. acmon lutzi* n. ssp., holotype and allotype, upper and undersides.
Figs. 13-16 *P. icarioides buchholzi* n. ssp., holotype and allotype, upper and undersides.

BLACKFLIES FROM UTAH AND IDAHO, WITH DESCRIPTIONS OF NEW SPECIES (SIMULIIDAE, DIPTERA).

BY C. R. TWINN,

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In 1934, Knowlton and Rowe (2) recorded five species of Simuliidae from Utah, including *Simulium* (*Simulium*) *vittatum* Zett., and four species described as new: namely, *S.* (*S.*) *brevicercum*, *S.* (*S.*) *nigresceum*, *S.* (*Eusimulium*) *pilosum*, and *S.* (*E.*) *utahense*. In May and October, 1937, G. F. Knowlton kindly forwarded to me for examination about seven hundred specimens of blackflies collected in various parts of Utah and Idaho. A study of this material showed that nine described species and six species new to science were represented. The distribution records and descriptions of the new species are given in the following pages.

Simulium (Prosimulium) unicum n. sp

Female.—With the characters of the sub-genus: radius setose on its entire length, radial sector forked, setae on the costa not mixed with spinules, small basal cell present; calcipala and pedisulcus absent, hind second tarsus much longer than the width of the basitarsus. Similar in size and allied to *hirtipes* Fries, but readily distinguished from the latter by its 10-jointed antenna* (fig. 1b), and other characters included in this description.

Antennae 10-jointed, rather longer and more slender than in *hirtipes* (fig. 1c), about one-fourth longer than the fore basitarsus. Wing veins less distinct; hairs on the costa and radius shorter and sparser, the subcosta bare. Claws simple. Abdominal tergites more broadly chitinized than in *hirtipes*, the plates on tergites three, four, and five less distinctly reduced; sternites one, two, and three largely membranous, the remainder with small chitinized plates. Genitalia (fig. 1a); similar to *hirtipes*, but more heavily chitinized; length of basal portion of anal lobe one and one-half times the width of cercus; forks of genital rod broadly expanded apically.

Holotype.—Female, Morgan Utah, 6.v.37 (G. F. Knowlton): Canadian National Collection (slide).

Simulium (Prosimulium) fulvum Coq.

Prosimulium fulvum Coquillett, Proc. U.S. Nat. Mus., Vol. 25, p. 96, 1903.

This species was represented by one female taken at Logan, Utah, June 4, 1937, by F. C. Harmston.

Simulium (Eusimulium) aureum Fries

Simulia aureus Fries, Monogr. Simul. Suec., p. 16, 1824.

Three males and one female were labelled Logan, Utah, the former collected on May 11 and Sept. 2 and 14, 1937, by G. F. Knowlton and F. C. Harmston, and the female on Sept. 14, 1937, by G. F. Knowlton.

Simulium (Eusimulium) pilosum K. & R.

Eusimulium pilosum Knowlton and Rowe, Ann. Ent. Soc. Amer., xxvii: 580, 1934.

The collection included six females of *pilosum* which I compared with a paratype in the National Collection. Knowlton and Rowe in their paper on Utah Simuliidae (2) stated that this species and *utahense* key out to *boreale* (Malloch) in Dyar and Shannon's revision (1). This may give one the impression that their species have a tuft of pile on the mesopleural membrane, a very distinctive character of *boreale*. This is not the case, at least with *pilosum*, although the usual pleural tuft is present. Furthermore, they described the antenna of *pilosum* as 10-segmented; actually it is 11-segmented, the first segment being very small. It would seem likely that the other three species of *Eusimulium* and *Simulium* included in their descriptions also have 11-segmented antennae, which is normal for the species of these two subgenera.

The specimens before me were collected as follows: Logan, Utah, May 17 and Sept. 22, 1933, T. O. Thatcher; Sept. 17, 1934, G. F. Knowlton; Oct. 3, 1937, D. E. Hardy: Providence, Utah, April 19, 1935, W. L. Thomas: Greendale, Utah, Sept. 11, 1937, Knowlton and F. C. Harmston.

*S. (P.) *decemarticulatum* Twinn (3, p. 110) also has the antenna 10-jointed, but the claws are bifid.

Simulium (Simulium) hearlei n. sp.

Male.—Length* 2-2.5 mm.; wing 2.2-3.1 mm. With the characters of the sub-genus: radius bare between the stem vein and radial sector, sector simple, hairs on costa mixed with spinules; calcipala and pedisulcus present, length of hind second tarsus less than twice the width of basitarsus *Head*: black; clypeus with silver-grey pollinosity, and sparse, rather long silvery hairs; antenna 11-jointed, black with pale pubescence, basal joints dull reddish-brown, almost black; palpi about as long as antennae. *Thorax*: dark reddish-brown to black with opaque grey to silver pollinosity. Mesonotum opaque black with a rather broad marginal band of light-reflecting silver-grey pollinosity; anteriorly this band is interrupted and extends back across the disk to form two tapering vittae reaching the posterior margin; pubescence hairlike, silvery on the pale parts, bronzy-black, shorter and sparser elsewhere. Scutellum opaque black, with a fringe of rather long pale hairs; postnotum bare, black, silvery pollinose; pleural tuft pale. *Wings*: hairs on base of wing pale, elsewhere darker; sub-costa bare. Halteres light yellow, base of stem darker, with pale hairs. *Legs*: black; basal third of mid and hind tibiae, basal two-thirds of hind basitarsus, and basal third of mid basitarsus, pale; dorsal surface of front tibia with a conspicuous white, pollinose patch; pubescence pale, silvery, to black. Hind basitarsus about 8 x 1 and one-half the width of tibia; calcipala minute, pedisulcus deep. *Abdomen*: opaque black, with lateral pearlaceous pollinose patches on segments two, five and six. Basal fringe pale; pubescence on dorsum short, sparse, dark-brown; longer, pale, hairlike, at the sides. Tergal plates only slightly reduced in width; second sternite membranous, others with small chitinized plates. *Genitalia* (fig. 2a, b, c, d): somewhat similar to *vittatum* Zetterstedt. Side-piece distinctly longer than wide, conical; clasper about one-half length of side-piece, truncate, with two small terminal teeth. Adminiculum broad, convex above, emarginate below; weakly chitinized, finely hirsute; basal prongs short, outwardly expanded, truncate. Adminiculum arms with elongate teeth; lateral plates broad. Median process or penis about twice as long as wide, gradually tapering and bluntly rounded, broad end cleft mesially.

Holotype.—Male, Ft. Duchesne, Utah, 11.vii.37, G. F. Knowlton and F. C. Harmston ("grass sweepings"): Canadian National Collection (slide).

Paratypes.—Seven males, as follows: Midvale (two specimens) 27.viii.37, G. F. Knowlton; Ft. Duchesne, 11.viii.37, Knowlton and Harmston; Logan, 16.ix.37 ("at light"), Knowlton and Harmston, 3.x.37, D. E. Hardy; Juab, 14.vi.35, G. F. Knowlton; Granite, 24.vii.35 ("at light"), W. M. Allen.

This species is dedicated to the late Eric Hearle*, a keen student of the Simuliidae, whose study of the forms in Western Canada was cut short by his untimely death.

Simulium (Simulium) idahoense n. sp.

Male.—Length 1.7-2.1 mm. (average of five specimens 1.9 mm.); wing 2.1-2.4 mm. (average 2.3 mm.). Similar in many respects to *hearlei* but differs as follows: The basal joints of the antenna paler; the two pollinose mesonotal

*The linear measurement of this and other species herein described were made from dried, pinned specimens.

[s]Obit. April 17, 1934.

vittae terminate before the middle of the disk; mesonotoal pubescence short, pale, silvery or golden; scutellum yellowish with marginal hairs silvery or pale golden. The legs pale, yellowish, except the following parts which are black: front tarsi, apical third of mid basitarsus, apical two thirds of mid second tarsus, hind coxae, apical halves of hind femur and tibia, apical third of hind basitarsus, and apical half of hind second tarsus. The hind tarsus measures about 6 x 1 and three-fifths the width of tibia. *Genitalia* (fig. 3a, b): side-piece rounded quadrate; clasper about two-thirds length of side-piece, a small tooth at tip. Adminiculum short, broad, weakly chitinized, finely hirsute; basal prong moderately long, slender; adminiculum arms somewhat similar to *hearlei;* median process with the sides more or less parallel.

Holotype.—Male. Riverdale, Idaho, 11.ix.34, C. F. Smith ("taken at light"): Canadian National Collection (slide).

Paratypes.—Thirty-two males: of these, 31 specimens were taken at Riverdale on various dates in late August and early September, 1934, by C. F. Smith and G. F. Knowlton, and one at Preston, September 13, 1934, by C. F. Smith.

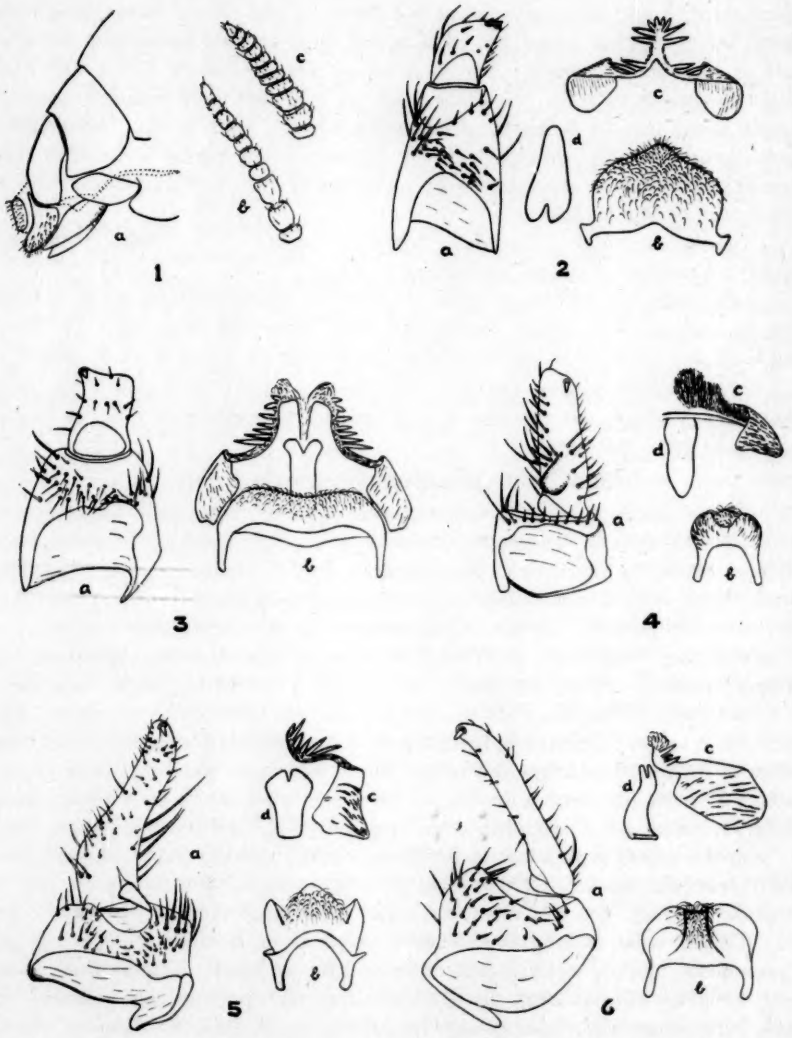
Note.—This species may prove to be the undescribed male form of *S. bivittatum* Malloch, but this can be ascertained with certainty only by rearing both sexes from the pupae.

Simulium (Simulium) turmale n. sp.

Male.—Length about 1.8 mm.; wing 2.2 mm. A small, black species. *Head*: black; clypeus, 11-jointed antennae and palpi, black; pubescence black. *Thorax*: black, the pleura with inconspicuous greyish pollinosity, the mesonotum opaque black, with rather abundant, recumbent, hair-like, bronzy-black pubescence; the lateral and posterior margins of the mesonotum silver-grey pollinose, anteriorly encroaching on the disk to form two rather widely separated light-reflecting pollinose patches. Scutellum black; hairs black. Postnotum black, with silver-grey pollinosity. Pleural tuft black. *Wings*: pilosity black; sub-costa bare. Halteres bright yellow; stem black, hairs black. *Legs*: entirely black, except the basal halves of the hind basitarsus and second tarsus which are somewhat paler; dorsal surface of front tibia with a dusting of silver-grey pollinosity; hairs black. Hind basitarsus about 4 x 1 and nine-tenths width of tibia. *Abdomen*: opaque black, the second segment with a lateral pearlaceous patch; basal fringe and short hair-like pubescence black. Chitinization of tergites and sternites as in *hearlei. Genitalia* (fig. 4a, b, c, d); side-piece wider than long, setose on the upper margin. Clasper twice as long as side-piece, rather stout, a single tooth at tip, and a prominent, apically denticulated, arm or lobe at base. Adminiculum stout, about twice as wide as long, densely chitinized, the upper margin rounded, trilobed, hirsute mesially; basal prongs long, truncate, slightly divaricate. Adminiculum arms densely fimbriate. Median process somewhat spatulate.

Holotype—Male, Logan, Utah, 16.ix.37, G. F. Knowlton and F. C. Harmston ("at light"): Canadian National Collection (slide).

Note.—The hypopygium of this species appears to be similar to *vandalicum* D. & S. (1, p. 44). However, I have no specimens of the latter, and Dyar and Shannon's entire description of the type specimen taken at Fallen Leaf, California, consists of a single sentence which reads: "As in *perissum* but the basal branch



EXPLANATION OF PLATE III.

Fig. 1: *S.* (*Prosimulium*) *unicum* n. sp. (a) female genitalia; (b) antenna: 1 (c) antenna of *hirtipes* Fries. Fig. 2: *S.* (*Simulium*) *hearlei* n. sp. (a) side-piece and clasper; (b) adminiculum; (c) adminiculum; arms; (d) median process or penis. Fig. 3: *S. idahoense* n. sp. (a) side-piece and clasper; (b) adminiculum; adminiculum arms and penis. Fig. 4: *S. turmale* n. sp. (a) side-piece and clasper; (b) adminiculum arm; (d) penis. Fig. 5: *S. knowltoni* n. sp. (a) side-piece and clasper; (b) adminiculum; (c) adminiculum arm; (d) penis. Fig. 6: *S. fratermum* n. sp. (a) side-piece and clasper; (b) adminiculum; (c) adminiculum arm; (d) penis. (Genitalia all drawn to the same scale).

of the clasper is reduced to a narrow, heavily spinose ridge," illustrated by a poor drawing. No other characters are given. The adminiculum of my specimen differs materially from that of *perissum* D. & S., which Dyar and Shannon's description indicate as identical to *vandalicum*. I, therefore, consider the specimen before me as a distinct species.

Simulium (Simulium) knowltoni n. sp.

Male.—Length about 2.5 mm.; wing 3 mm. *Head*: clypeus silvery pollinose, and with rather long, blackish hairs; antenna eleven-jointed, entirely black, with short pale pubescence; palpi black. *Thorax*: black, with inconspicuous white pollinose dusting on the pleura and margins of the mesonotum. Disk of mesonotum opaque black, moderately densely clothed with bronzy or golden pubescence. Scutellum black, with a fringe of bronzy hairs. Postnotum black, silvery pollinose. Pleural tuft black. *Wings*: hairs on stem vein, base of costa, and elsewhere, black; sub-costa bare. Halteres pale yellow, the base of stem black, hairs black. *Legs*: predominently black, only the basal third of hind basitarsus pale; pubescence black, with a scattering of paler hairs. Hind basitarsus about 5 x 1, slightly more than two-thirds width of tibia. *Abdomen*: opaque black, pale beneath, and with lateral pearlaceous pollinose markings on segments two, five, six and seven. Basal fringe long, rather pale; other pubescence dark-brown to black, sparse. Chitinization of tergites and sternites as in *hearlei*. *Genitalia* (fig. 5a, b, c, d): side-piece rounded quadrate, wider than long. Clasper about twice as long as side-piece, slightly curved, moderately tapering; a prominent, heavily chitinized, tooth-like structure at base; a spine at tip. Adminiculum stout, chitinized, finely hirsute mesially, upper margin tridentate; basal prongs prominent, subparallel, each with a short lateral projection. Adminiculum arms with a row of long marginal teeth. Median process two-thirds as wide as long; narrow and truncate, broad end with a mesial cleft.

Holotype.—Male, Logan, Utah, 23.vii.35, G. F. Knowlton and C. F. Smith ("at light"): Canadian National Collection (slide).

Paratypes—Two males, Logan, Utah, 16-18.ix.37, G. F. Knowlton and F. C. Harmston.

This species is dedicated to G. F. Knowlton, to whom I am indebted for the opportunity to study the material listed or described in this paper.

Simulium (Simulium) fraternum n. sp.

Male. Length about 2 mm.; wing 2.5 mm. As the mesonotum, scutellum, and wing of the single specimen at hand are denuded, the colour and character of the vestiture cannot be indicated. However, the pleural tuft and abdominal basal fringe are black. The characters of the head are as in *knowltoni*. Mesonotum opaque black, the pearlaceous marginal band forming two conspicuous silver-grey patches anteriorly, separated by a medial black band extending forward from the disk. The legs dark-brown or black, except the basal portions of the hind tibia and basitarsus, which are paler; dorsal surfaces of the front and mid tibiae white pollinose. Hind basitarsus broad, about 3 x 1, and seven-eighths the width of tibia. *Genitalia* (fig. 6a, b, c, d): side-piece wider than long, outer apical angle somewhat produced. Clasper nearly twice as long as side-piece, slender; a small, rounded, lobe at base, and a terminal tooth. Adminiculum largely membranous, twice as wide as long, rounded, quadrate, the upper margin arcuate,

mesially hirsute; basal prongs rather long, stout, densely chitinized. Adminiculum arms with several small teeth mixed with fimbriae; basal plates broad, fimbriate. Median process flat, somewhat ribbon-shaped, cleft at one end.

Holotype.—Male, Farmington, Utah, 4.ix.34, G. F. Knowlton and C. F. Smith.

Simulium (Simulium) vittatum Zett.

Simulium vittatum Zetterstedt, Ins. Lappon. Dipt., p. 803, 1835.

More than five hundred of the seven hundred odd specimens in the collection belonged to this species. Of these, 381 were females (some labelled taken "on horse") and 132 were males. The collections were made by G. F. Knowlton, C. F. Smith, and others, at various dates from 1934 to 1937. Utah was represented by thirty-five localities, and Idaho by four.

Simulium (Simulium) bivittatum Mall.

Simulium bivittatum Malloch, U.S.D.A. Bur. Ent. Tech. Ser. No. 26, p. 31, 1914.

Eighty-seven specimens of this species, all females, were labelled as from five localities in Idaho. Most of them were indicated as taken "on horse," or "at light." Seventy-four of the specimens were collected at Riverdale, by C. F. Smith, from August 4 to Sept. 11, 1934. The remainder were taken as follows: Glencoe, August 24, 1934, Knowlton and T. O. Thatcher; Mink Creek, August 24, 1934, Knowlton and C. F. Smith; Strawberry Creek, July 15, August 24 and Sept. 11, 1934, and Franklin, July 17, 1937, Knowlton and Smith.

Simulium (Simulium) occidentale Tws.

Simulium occidentale Townsend, Psyche, 6:107, 1891.

This species was represented by one female, in rather poor condition, taken at Benson Wd., Utah, June 17, 1909, by E. G. Titus.

Simulium (Simulium) venator D. & S.

Simulium venator Dyar and Shannon, Proc. U. S. Nat. Mus., Vol. 69, Art. 10, p. 36, 1937.

Two females labelled "on horse with brain fever" were dated August 6, 1934, Lewiston, Utah, J. A. Rowe. A third female was collected at Riverdale, Idaho, August 22, 1934, by G. F. Knowlton and C. F. Smith.

Simulium (Simulium) venustum Say

Simulium venustum Say, Journ. Acad. Sci. Phila., 3:28, 1823.

Five females were labelled as follows: Logan, Utah, August 7, 1934, G. J. Sorensor; July 10, 1935, G. F. Knowlton and C. F. Smith; Granite, Utah, July 23-25, 1935, W. M. Allen.

Simulium (Simulium) corbis Twinn

Simulium (*Simulium*) *corbis* Twinn, Can. Journ. Res., D, 14:147, 1936.

This species was originally reared and described from the Blanche river, Quebec. The collection from Utah and Idaho included forty-two specimens, with both sexes represented. These were taken as follows: Utah: Logan, April-Oct. 1933, 1935-37, G. F. Knowlton *et al;* Randolph, July 10, 1937, Knowlton and F. C. Harmston; Nibley, Oct. 19, 1923, G. F. Knowlton; Blacksmith Fork, April 27, 1937, G. F. Knowlton; Farmington, April 20, 1935, Knowlton and C. F. Smith; Providence, July 29, 1935, Knowlton and Smith. Idaho: Riverdale, Sept. 2, 1934 and May 10, 1935, Knowlton and Smith; Sharn, April 28, 1934, Knowlton and Smith.

The species is evidently widely distributed in North America, as from other sources, I have received specimens collected at Churchill, Manitoba (1934 and

1936), Jasper Park and Maligne Lake, Alberta (1915), and Howser, Selkirk Mts., British Columbia (1905). I have also taken it in Ontario and Quebec.

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2. Knowlton, G. F. and J. A. Rowe, "New Blood-sucking Flies from Utah (Simuliidae, Diptera)," Annals Ent. Soc. Amer., xxvii: 580-584, 1934.
3. Twinn, C. R., "The Blackflies of Eastern Canada (Simuliidae, Diptera)," Can. Journ. Research, D, 14: 97-150, 1936.

NEW LEPIDOPTERA FROM SOUTHERN CALIFORNIA*

BY J. McDUNNOUGH,
Ottawa, Ont.

In the course of determination work, largely for Dr. J. Comstock of the Los Angeles Museum, I have received several species of Lepidoptera which appear to be undescribed. I therefore offer descriptions of these in the present paper. Through the courtesy of Dr. Comstock and Mr. Don Meadows the types are deposited in the Canadian National Collection.

Hadeninae

Trudestra projecta n. sp.

Male. Antennae finely ciliate. Palpi clothed with an admixture of white and blackish scales and with numerous long hairs ventrally below second joint. Front with a strong protuberance, much as in the genotype, *hadeniformis* Sm., but somewhat narrower and with the central projection less prominent and more rounded apically; a tuft of gray and black hairs between the antennae. Squammation of pectus very rough, hairy, deep gray; of thorax moderately smooth, consisting of an admixture of light gray and blackish scales and hairs; collar with a faint black median transverse band; patagia with variably distinct black band near dorsal margin; a moderately strong median tuft on metathorax. Abdomen pale ochreous-gray with considerable sprinkling of dark scales; no obvious dorsal tufting. Primaries rather narrow light gray with a heavy (and rather variable) sprinkling of blackish scaling; t. a. and t. p. line obsolescent (or rarely visible), the most prominent features of the maculation being the usual spots and the pale s. t. line. Orbicular a narrow, flat, whitish oval, outlined in black and with central dark streak; reniform moderate in size, partially outlined in black and filled with white and deep grayish scaling, the latter predominant in the lower portion; claviform a moderately sized black loop with gray filling. S. t. line pale, whitish, irregular, close to outer margin and with prominent inward angle above tornus, shaded inwardly, particularly in lower half, with dull brown which shading tends to form arrow-marks; terminal area beyond s. t. line largely deep smoky, except below apex of wing. Veins finely outlined in black. A broken black terminal line. Fringes an admixture of whitish and deep smoky scaling, the latter predominating, and presenting a faint, checkered appearance. Secondaries dull whitish, shaded lightly with smoky along costa and outer margin; a small smoky discal dot. Veins and outer margin prominently outlined in deep smoky. Fringes dull whitish. Beneath ground color of both wings whitish, heavily sprinkled with smoky along costa (at times more or less over whole

*Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa.

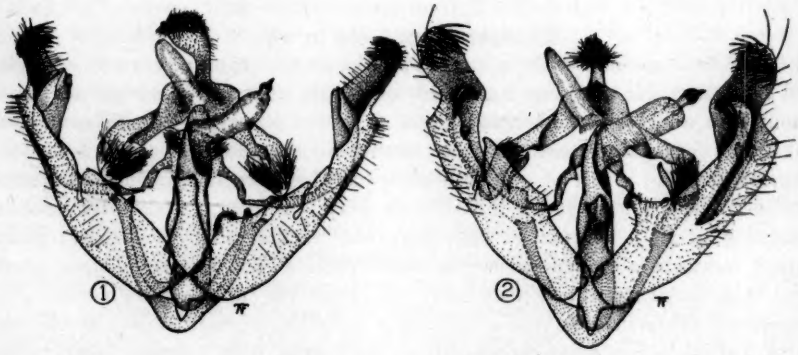
wings). Smoky tinges in cell and along inner margin of primaries, which show a small discal lunule, beyond which the veins are distinctly outlined in deep smoky; fringes of primaries more distinctly checkered than on upper side. Secondaries with dark discal dot and with veins outwardly faintly outlined in smoky; faint dark terminal line; pale fringes.

Female. Much as in male but primaries usually more suffused with dark shades and the secondaries with the dark outer shading much deeper and more extended toward base of wing. On the underside also the dark sprinkling usually covers most of the wings. Expanse 27 mm.

Holotype—♂, Yermo, S. Bern. Co., Calif., April 8, 1937 (Andrews and Martin); No. 4313 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—16♂, 10♀, same data; 5♂, 3♀ in the Canadian National Collection; 1♂, 1♀ in the United States National Museum, and the balance returned to Dr. J. Comstock.



Male genitalia of 1, *Trudestra projecta* n. sp. 2, *Scotogramma hirsuta* n. sp.

In size, wing-shape, and general appearance the species bears considerable resemblance to *Scotogramma fulgora* B. & McD., but the striking frontal prominence renders it readily recognizable. The male genitalia (fig. 1) show a number of points of dissimilarity, notably in the shape of the uncus and the assymetry of the sacculus, from *hadeniformis* Sm., the type of the genus *Trudestra* McD. However, I am placing the species here for the present to avoid creating a new generic term until such time as the whole group can be thoroughly revised.

Scotogramma hirsuta n. sp.

Apparently belongs in the *stretchi* group and is variable in appearance, but characterized by its hairy squammation and the distinct pinkish-ochreous shades of the forewings.

Male. Antennae rather strongly ciliated. Palpi very hairy, ochreous mixed with blackish, the long ventral hairs being largely blackish. Front with the usual rounded prominence. Head and thorax roughly clothed with hair, color varying from light ochreous with slight admixture of gray to rather deep smoky gray (Holotype) with tinges of ochreous around collar. Pectus with long gray hair;

tibiae hairy, the color variable as on thorax. Abdomen with sparse ochreous hairs, thicker laterally, and no obvious dorsal tufting. Primaries rather powdery in appearance and with diffuse maculation, in color a deep smoky gray, variably powdered with light ochreous in which a decidedly pinkish tinge is usually present; this pinkish-ochreous color predominates in the basal area before t. a. line and also generally in the terminal area, the median area showing more of the smoky-gray shade and consequently appearing darker than the rest of the wing. T. a. line single, dark, slightly outwardly oblique, with prominent median bulge and inward angles in cell and on vein 1. Orbicular and reniform improminent, the former represented by an obscure pale, oval patch, the latter rather narrow, pale, with smoky filling. T. p. line strongly dentate, single, dark, outwardly rounded below costa and then parallel to outer margin with rather prominent scallop above vein 1, defined outwardly by a narrow ochreous or pinkish shade, the points of the teeth tending to show white dots. S. t. line faint, irregular, best recognized by the difference in color between the smoky subterminal area and the paler terminal one. Fringes concolorous, slightly checkered with ochreous at times. Secondaries deep smoky, paling considerably toward base of wing; veins lightly marked with deep smoky; small dark discal spot; fringes light ochreous to pale smoky. Beneath primaries dirty whitish with discal lunule and postmedian curved line, beyond which the subterminal area is deep smoky. Secondaries similar in color with discal dot and faint postmedian curved line, the veins crossing this being slightly accentuated as dark streaks. Expanse 30 mm.

Female. Very similar to male, the pink shade of primaries well evident over the dark ground-color. Secondaries somewhat deeper in color than in male.

Holotype—♂, Yermo, Mohave Desert, Calif., March 10. 1937 (J. A. Comstock); No. 4314 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—1♂, Furnace Creek, Death Valley, Calif., April 7, 1935; 1♂, Death valley, Calif., December 1935; 5♀, same data as *Allotype*. Of these 1♂, 2♀ are in the Canadian National Collection, 1♀ in the Collection of the United States National Museum, the balance returned to Dr. Comstock.

GEOMETRIDAE

Larentiinae

Zenophleps pallescens n. sp.

Female. Palpi, head and thorax creamy-gray. Primaries pale creamy. Basal line black, upright, slightly incurved at costa. T. a. line outwardly rounded, diffuse, blackish, rather finely dentate, bordered outwardly by a light brown shade. The pale space between basal and t. a. lines is crossed by a faint dotted light brown line, rather closer to t. a. than to basal line. T. p. line diffuse, blackish, slightly bent outward below costa and then perpendicular to vein 5, continuing with a strong bulge across veins 4 and 3, composed of two scallops; incurved across vein 2 and then with slight outward curve to inner margin, faintly scalloped; preceded on inner side by a rather broad light brown shade, the inner edge of which is slightly scalloped and joins with the outer brown shade of t. a. line in the fold. Two small black spots on costa between t. a. and t. p. lines, giving rise to faint broken light brown crenulate lines which enclose the small dark discal dot and are more or less fused with the other brown shades on inner half

of wing. S. t. line a smoky dentate shade, arising from a small dark patch on costa, excurved below costa and then parallel and close to outer margin. This s. t. line is preceded in the pale subterminal space by a dotted light brown line arising from a small smoky patch on costa. Faint broken black terminal line. Fringes pale. Secondaries faintly smoky, paler at base, with traces of a curved smoky median line and a fainter crenulate subterminal one; between the two are some slight smoky points on the veins. Faint dark terminal dots. Fringes creamy with slight ochreous tinge. Expanse 25 mm.

Male. As far as can be told from the single, much worn specimen before me, the maculation is very similar to that of the female. The antennae are strongly pectinate, the genitalia very similar to those of *lignicolorata* Pack.

Holotype— ♀, New York Mts., S. Bern. Co. Calif., April 5, 1937 (Andrews and Martin); No. 4315 in the Canadian National Collection, Ottawa.

Allotype— ♂, same data.

Paratypes—6 ♀, same data as Holotype; 4 ♀, Old Woman Mts., Mohave Desert, Calif., March 14, 1937 (J. A. Comstock). Of these 3 ♀ are in the Canadian National Collection, 1 ♀ in the Collection of the United States National Museum and the balance returned to Dr. Comstock.

On account of the better condition of the specimen I have made the female the holotype. There is considerable variation in color shown in the specimens before me, some of them, due to a spreading of the light brown areas, showing a decided ochreous tinge to the ground-color. The distinctness of the brown cross-lines in the median area is also variable, but in all specimens the diffuse blackish t. a. and t. p. lines stand out strongly and appear quite characteristic.

Eucosmidae

Eucosma avalona n. sp.

Male. Palpi, antennae, head, thorax and abdomen creamy white. Primaries wood-brown sprinkled with pale scaling in terminal half; costa beyond fold narrowly silvery-white; a narrow silvery streak from near base of wing along radius to apex of wing where it terminates in a slight enlargement; a broad streak of same color from base of wing through fold, narrowing suddenly to terminate at tornus; above tornus a large silvery patch of irregular shape; vein 1 outlined in silver, especially towards base, and inner margin also narrowly silvered. Fringes whitish, flecked with brown. Secondaries pale smoky with white fringes. Expanse 25 mm.

Holotype— ♂, Avalon, Santa Catalina Is., Calif., Sept. 21, 1932 (D. Meadows); No. 4316 in the Canadian National Collection, Ottawa.

Paratype— ♂, same data, in Collection of the United States National Museum.

The species was kindly determined for me by C. Heinrich of the United States National Museum as new. I am indebted to the collector for permission to retain the types.

A NEW SPECIES OF GYRINUS, WITH A NOTE ON DINEUTUS ROBERTSI LENG. (COLEOPTERA, GYRINIDAE)*.

BY HUGH B. LEECH,
Vernon, B. C.

Gyrinus hoppingi n. sp.

A medium sized, polished black species, closely resembling *picipes* Aubé in general facies. Under side polished metallic black; legs dark, especially the middle and hind pairs.

Length 4.9-6.0 mm.; width 2.75-3.25 mm., the females larger than the males. Rather broadly oval, moderately convex. Clypeus, labrum, antennae, lateral margins of the pronotum and elytra, and elytral suture, bronzed. Terminal segments of palpi piceous, penultimate segments rufescent.

Pronotum somewhat aeneous laterally; the transverse impressed line of punctures usually close to the anterior margin, the space between the line of punctures and the anterior margin usually rather strongly convex.

Elytra distinctly aeneous at the sides, most strongly so close to the lateral margin, and progressively less inwards toward the middle of each elytron. Strial punctures fine near the suture, appreciably larger laterally, a little more so than in *opacus*, but less than in *picipes*. Surface polished, feebly and sparsely micropunctate; very finely alutaceous laterally and posteriorly, especially in the female.

Under side polished metallic black, the epipleura slightly aeneous and at times somewhat rufous medially. Front tibiae typically piceo-rufous, the femora lighter; claws rufous. Middle and hind femora piceous, the tibiae and tarsi dark rufous, the claws yellowish. All the legs may vary in color to dark ferrugineous. *Male genitalia*—Lateral lobes of the aedeagus piceous to rufo-piceous; the median lobe rufo-testaceous, darker along the median carina and apically, where it is piceous brown. When viewed from the side the aedeagus is seen to be strongly curved at the middle, so that the apical half (comprising most of the parts shown in the illustrations accompanying Dr. Fall's revision, 1922, Trans. Amer. Ent. Soc. XLVII, 269-306, pl. XVI) is at an angle of about 45° with the basal half. The median lobe is broad and parallel sided, as wide as, or very slightly narrower apically, than a lateral lobe; it is strongly roof-shaped in the apical half, the carina becoming obsolete just before the apex, which latter is angulate and, from a lateral view, slightly prominent, somewhat as in *lugens*. In its basal half the middle lobe is broader, and concave medially. It is shorter than the lateral lobes, more so than usual in our species.

Holotype:— ♂. Length 5.12 mm.; width 2.82 mm. Tributary to Vance Creek, Trinity Valley, B. C., September 17th, 1937 (Hugh B. Leech); No. 4302 in the Canadian National Collection, Ottawa.

Allotype:— ♀. Length 6.0 mm.; width 3.25 mm., same data, October 9th, 1937. In the Canadian National Collection.

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*Contribution from the Division of Forest Insects, Dominion Entomological Branch, Vernon, B. C.

Paratypes:—1 ♀, same data as Holotype; 10 ♂, 5 ♀, same data as Allotype; 2 ♂, 3 ♀, Trinity Creek, Trinity Valley, B. C., September 12th, 1937 (Hugh B. Leech).

It is a pleasure to name this species for Mr. Ralph Hopping of Vernon, B. C., to whose encouragement and generosity I owe many of the determinations and specimens in my collection. Paratypes will be distributed as follows: to the California Academy of Sciences, the British Museum, Mr. R. Hopping, Dr. H. C. Fall, Mr. J. B. Wallis, Mr. G. Stace Smith.

The type locality, Trinity Valley, is in central southern British Columbia, a few miles north of Lumby, and about 20 miles east of Vernon.

Hoppingi would run in Fall's key to *picipes,* but structurally it is allied to *opacus* Sahlberg, and when males are present can be very readily separated from all but that species by the shape of aedeagus. In *opacus* the body is narrower and less convex, the elytral surface very much more coarsely sculptured, and the median lobe of the aedeagus is gradually narrowed from base to apex. Females of *hoppingi* are not so readily placed; they may, by the more convex form and polished surface, be separated from the same sex of *opacus, wallisi, instabilis* and *dubius.* This last species I have not seen; in the original description Wallis (1926, Can. Ent. LVIII, 4, p. 93-94) compares it with *picipes* only, but Brown (1930, Can. Ent. LXII, No. 10, p. 237) reporting on a series from the North Shore of the Gulf of the St. Lawrence, remarks that he cannot separate the females from those of *opacus,* with which it occurred. The legs in *hoppingi* are darker than in *wallisi* or *instabilis,* which have never been recorded from British Columbia.

After considerable study, I am unable to give any completely reliable method for separating females of *hoppingi* from those of *picipes,* which occurs in the same region. In my series of over 60 specimens of *picipes,* representing localities in British Columbia, Washington, Oregon and California, the form is always narrower posteriorly than in *hoppingi,* the legs are rarely as dark, and the micro-punctation and alutaceous sculpture of the elytra less obvious. When examining the sculpture it is well to clean each specimen with a camel's hair brush and chloroform, since even a very thin layer of grease can produce a most deceptive effect of roughness.

In the introductory remarks to his essay on the North American species of *Gyrinus,* Dr. Fall, gives a number of instances in which schools of *Gyrinus* contained a mixture of from three to five species. Curiously enough this habit seems to be very rare in the west. *G. affinis* is the commonest species in streams in the interior of British Columbia, and many hundreds may be taken from a school, without finding any other species; at times a few *picipes* are intermixed. On lakes, *bifarius* and *confinis* are common, and the large schools are usually a pure culture. *Pleuralis* occurs most often with *affinis.* On the coast, *picipes* is commonest, and large schools often contain nothing else, or at most a few *affinis.* In northern California I have collected schools of *plicifer* and *bifarius,* both in pure cultures.

Dineutus robertsi Leng.

Some two years ago I was able to secure, through the kindness of Mr. Charles W. Leng, his collection of *Gyrinidae,* including the type series of *Dineutus robertsi* Leng, of which no type specimen was designated. I have selected as a *Lectotype,* a male labelled (as are the Co-types) "Clayton, Ga. 2000-3700 ft. War Woman Creek, Rabun Co. C. W. Leng Collection." This specimen is the largest of the type series, length (anterior margin of clypeus to posterior tips of elytra) 15.50 mm.; width 10.0 mm. It will be deposited in the Canadian National Collection at Ottawa. The smallest co-type is a female, length 12-0 mm.; width 7.5 mm.

The aedeagus of *robertsi* is readily separated from that of *ciliatus* Forst., its nearest ally. In *ciliatus* the median lobe is, in a vertical plane, progressively thinner towards the apex, where it is very thin, upturned, and sharply pointed. In *robertsi,* the median lobe is thick in a vertical plane, not turned upward, and very bluntly pointed apically. There should be no trouble in separating females of the two species; *robertsi* is entirely bronzed above, non-vittate; beneath it is testaceous. Examples of *ciliatus* occur in which the under side is dark testaceous, and the upper surface bronzed, but the lateral elytral vittae are always discernible. In doubtful cases it is well to remember that in *robertsi* the antennal club is slightly narrower and more parallel sided, while the terminal segment is longer and more pointed.

In addition to the above mentioned co-types, I have *robertsi* from Clemson College, S. C. (O. L. Cartwright) and Clarkesville, Ga.; one of the latter, a male, is not quite 12 mm. long.

A NEW RACE OF PLEBEIUS SCUDDERI FROM CAPE BRETON ISLAND. (LEPID. LYCAENIDAE)*

BY T. N. FREEMAN.
Ottawa, Ont.

While collecting in the Cape Breton region of Nova Scotia early in July 1936, Dr. J. McDunnough and the writer collected a series of more than one hundred specimens of a *P. scudderi* form, commonly flying in a sphagnum bog about one and one half miles north of Baddeck on Highway No. 5, and which we thought might possibly be the race *aster,* described by Edwards from the Cape Race region in southern Newfoundland.

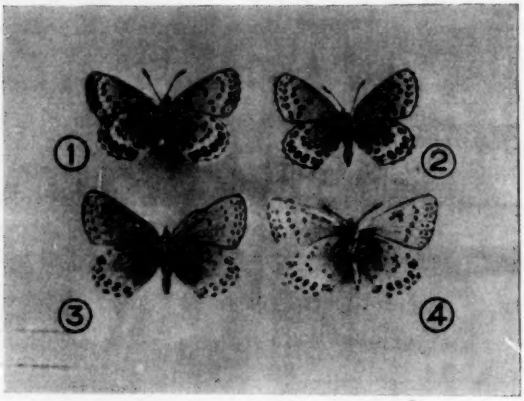
In the bog, females were observed to oviposit two eggs on *Kalmia polifolia,* one on *Empetrum nigrum* and one on *Ledum palustre.* At that time two live females were placed in jars containing these three plants, only one of the butterflies living to oviposit 49 eggs on *Empetrum,* 6 on *Kalmia* and none on *Ledum.* It might be concluded from this that *Empetrum* is the favorite food plant and *Kalmia* secondary, while the one egg oviposited on *Ledum* may have only been incidental.

Through the courtesy of Mr. C. Heinrich of the United States National Museum, I have obtained a male of *aster* originally from the Barnes collection and probably topotypical which is labelled by Dr. McDunnough as having been

*Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa.

compared with Edward's type and found to agree.

This specimen (Fig. 4) compares very favorably with some specimens of a series collected by W. J. Brown at Natashquan, Que., a locality on the north shore of the Gulf of St. Lawrence, in that the black spots on the underside are distinct enough but minute. These spots on others of the Natashquan series are larger and intergrade with some of the smaller spotted Baddeck specimens which I am naming var. *empetri*, the latter agreeing in alar expanse with both the Natashquan series and the specimen from the Barnes Collection. Notwithstanding these similarities *empetri* can be separated from the Natashquan series, which I think is certainly *aster* (Fig. 3), by the characteristics of the undersurface noted below.



1. *P. scudderi empetri* n. var., holotype ♂, 2. allotype ♀ of same. 3. *P. scudderi aster* Edw. (♂, Natashquan, Que.) 4. *P. scudderi aster* Edw. (♂, Ex. Barnes Collection).

Plebeius scudderi var. **empetri** n. var.

Ground color of under side darker grey, the black spots much larger in general and more distinct; ends of nervures expanded into small black spots, the latter connected in both wings by a much more distinct black line and extending

5. *P. scudderi empetri* n. var., male genitalia.

slightly into the fringe, where in the primaries, they are almost connected to appear as a broken black line; anal angle of the secondaries with a distinctly large black blotch. Expanse 21-25 mm.

Holotype— ♂ Baddeck, N. S. July 3 (J. McDunnough) No. 4347 in the Canadian National Collection, Ottawa, (Fig. 1).

Allotype— ♀ same data, July 9, (Fig. 2).

Paratypes—87 ♂ ♂, 20 ♀ ♀, Baddeck, N. S. July 2-10, (J. McDunnough and T. N. Freeman).

Edwards originally described *scudderi* from the northern end of Lake Winnipeg, Man., and while I have seen no material from that region, I have specimens before me from Minaki, Ont., and Sandilands, Man., which approach the type locality. These specimens have an average alar expanse of 27 m. m., much larger than that of *empetri*, and are lighter on the undersurface; even with their greater size the black spots are no larger than those on the smaller specimens from Baddeck, consequently these spots on the latter appear crowded.

From a study of the male genitalia of *empetri* (Fig. 5), I can see no structural difference between the latter, *scudderi, aster, annetta* or even *anna*. They all appear to be of the *melissa* group but the male genitalia of the latter can be readily recognized by the much longer falces.

GRYLLOBLATTA CAMPODEIFORMIS WALKER—A NEW RECORD.

BY J. D. GREGSON,

Dominion Entomological Branch, Kamloops, B. C.

A new record for the distribution and environment of *Grylloblatta campodeiformis* Walker has been established by the recent discovery of this insect in the dry belt of British Columbia at an altitude of 1500 feet. The occurrence of the "ice bug" at this locality is of singular interest. Supposedly an inhabitant of only the coldest regions, such as are found along the margins of glaciers and mountain streams at high altitudes, this discovery shows that *Grylloblatta* can exist under extremely dry and hot conditions at a relatively low altitude.

The sole specimen collected to date, a male adult, was taken on November 14, 1936 from beneath a rock on the talus slope of Mt. St. Paul, Kamloops, B. C. This slope has a southern exposure, is covered sparsely by sage and bunchgrass, and by reason of its open position is, during the summer months, probably one of the hottest and driest areas near Kamloops.

The specific site of the capture was some thirty feet above the rock slide on a steep portion of a rocky cliff. The rock, by nature crumbly, had deep cracks extending several feet inwards. Although the surface temperature of this area may at times be very high, it is probable that at a sufficient depth within these crevices a relatively cool temperature could be obtained. Recordings made on July 19, 1937 at three p.m., when the air temperature was 28.9°C., showed the rock temperature to vary from 30°C. at the surface to 27.8°C. at a depth of two feet from the outside. Although the latter temperature is the same as the recorded heat prostration temperature of this insect[1], lower temperatures would undoubtedly be found in crevices at greater distances from the rock surface. By penetrating to these depths, the insect could probably escape the summer heat, coming out only during the cooler months to feed.

The weather at the date of the capture was cool, with frosts at night.

1. Mills, H. E. and Pepper, J. H.; Observations on *Grylloblatta campodeiformis* Walker, Ann. Ent. Soc. Amer., Vol. 30, No. 2, 1937, pp. 269-274.

Although subsequent searches were made at the same site during the winter and spring months, no other specimens have yet been obtained.

The identity of the only specimen on hand has been kindly verified by Professor G. J. Spencer of the University of British Columbia, and this determination confirmed by Dr. E. M. Walker of the University of Toronto.

BOOK NOTICES.

Recent Advances in Entomology, Second Edition, by A. D. Imms, M.A., D.Sc., F.R.S. T. & A. Churchill Ltd., London, England, 1937. 431 pp., 94 illustrations. Price 15s (sterling).

In the first edition of this book, published in 1931, the author attempted, quite successfully, the difficult task of bringing together in the compass of a single volume of reasonable size, the highlights of the advances made in the many fields of entomology. Due to the limitations of size, the book had to be somewhat of the nature of a review, with discussion limited, and details omitted.

In this edition, the scope is confined to the orginal fifteen chapters dealing with Aspects of Morphology, Metamorphosis, Palaeontology, Sense Organs and Behaviour, Coloration, Aspects and Applications of Ecology. Parasitism, and Biological Control. Taking into consideration the advances made in different fields all the chapters could have been altered or new ones added, but the author has revised quite extensively only those aspects of the subject which, in his estimation, have progressed the most. Thus under Morphology the segmentation of the head, the genitalia, and the homologies of certain appendages in the light of recent musculature studies have been altered materially. Metamorphosis has been revised to include a discussion of the hormones that may possibly be involved. The chapter on Palaeontology has been extensively revised and new illustrations added. Under the Sense Organs, the section dealing with response to visual stimuli has been extended and a section added on Stimulatory Organs. In the Application of Ecology, Biological Races and the Locust problem have been amplified by new material, and the chapters on Biological Control have been brought up to date. The sectional bibliographies have been supplemented, even when the section has not been extensively revised.

Although in general the sections whose interpretations or conclusions have been altered as a result of research during the past 6 years have been revised. grounds for criticism will doubtless be found by specialists in the individual fields. The author has, however, admirably succeeded in bringing the work up to date from the standpoint of the general entomologist and the student and teacher in particular, for whom it is primarily intended. For the latter it should be a welcome addition to entomological literature. R. H. OZBURN.

Die Blatt-Minen Mittel-und Nord-Europas by Prof. M. Hering, Berlin University, Germany, 631 pages with 500 text illustrations published by Gustav Feller, Neubrandenburg. 6 parts at 18 R. M. per part.

The sixth and final part of this monumental work on the leaf-miners of Central and Northern Europe (comprising Germany, Austria, Switzerland, Czecko-Slovakia, Poland, Baltic States. Scandinavia, Finland, Belgium, Holland and Great Britain) has just been received, completing a publication which, with-

out doubt, should be in the hands of every entomologist. It represents the work of more than fifteen years, during which the author has bred and correctly determined over 5,000 species of European leaf-mining insects. In the introduction the different types of mines, the orders of insects forming mines, the life-cycle of a mining insect, hints on breeding and collecting and other interesting and important features are briefly discussed. The balance of the work consists largely of determination-tables, following an alphabetical arrangement of host-plants according to their Latin names: under each heading a key to the various mines found on the individual plant has been prepared. Following these tables a list of host-plants in their natural order and a similar list of the genera of the actual miners, arranged according to orders, families, and subfamilies is given. On account of the great similarity between the European and the North American insect faunas such a work as this must inevitably be of value to workers in North America. J. MCD.

NEWS AND VIEWS

37TH ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF BRITISH COLUMBIA

The annual meeting of the Entomological Society of British Columbia was held in Vancouver on February 26th, 1938. The president, Mr. E. R. Buckell was in the chair. An attendance of thirty-three is reported. Among those present were Professor Trevor Kincaid and Dr. M. H. Hatch of the University of Washington, Professor B. G. Thompson of Oregon State College, Mr. R. L. Furness of the Northwest Experiment Station, Portland, and Mr. W. W. Baker of the U. S. Experiment Station, Puyallup. Thirteen new members were added to the roster.

There were 21 papers presented covering a variety of subjects including tick paralysis, sylvatic plague, shot-hole borers, the snow cricket, list of *Bibionidae* of B. C., insects attacking forest and shade trees, a triple *Stratiomyid* wing, food plants of *Lepidopterous* larvae, new insect occurrences on Vancouver Island and the Lower Fraser Valley, production of the earwig parasite, *Digonichaeta setipennis* Fall., list of stone flies of Cultus Lake region, fauna of B. C. birds nests, *Chionaspis pinifoliae* Fitch, the brine fly in B. C., ectoparasites of marmot and weasel, scale insects of B. C., moths of Robson, B. C., *Scudderia furcata* Brunner, and quarantine regulations.

E. P. Venables of Vernon, B. C., was elected president for 1938, W. G. Mathers of Vancouver and A. D. Heriot of Vernon, Vice-Presidents, and G. R. Hopping Honorary Secretary-Treasurer.

NEW CHECK LIST OF NORTH AMERICAN LEPIDOPTERA.

The Southern California Academy of Sciences has just issued an announcement of importance to students of Lepidoptera. This pertains to the forthcoming "CHECK LIST OF THE LEPIDOPTERA OF CANADA and the UNITED STATES OF AMERICA," Part 1, Macrolepidoptera, by Dr. J. McDunnough.

This list will be issued as Volume 1 of the Academy's new series of "Memoirs." It is being printed on a fine grade of offset book paper of very durable quality, which takes ink readily. The page size is 7 by 10 inches, and the

type page is approximately 4 by 7 inches, hence there is provided ample margin for adding notes.

The type face will be similar to that used in the Barnes and Benjamin List of Diurnal Lepidoptera of 1926, but there will be considerably more spacing between each name.

In addition to the regular issue of this List there are two special printings that are planned if the demand seems to warrant. The first is a printing of list and index on one side of page only, thus making every other page available for notes and additions.

The second is a special printing of the list, without index, on cards, (one side of card only) unbound, suitable for cutting out as labels.

The list will include all species published up to the first of January, 1938. It incorporates all of the important revisional studies made by the various specialists, together with the results of the author's own research. To American Lepidopterists, all of whom recognize Dr. McDunnough's outstanding position in the profession, this is all that needs to be said as a guarantee that the new "List" will be indispensable to workers in this Order.

Full particulars concerning the above may be obtained by writing Dr. John A. Comstock, Editor and Treasurer, Southern Calif. Academy of Sciences, c/o Los Angeles Museum, Exposition Park, Los Angeles, Calif., U. S. A.

WHITE ARSENATES TO BE COLOURED PINK

A recent press notice informs us that W. N. Watson, secretary of the Manufacturing Chemists Association, has advised the Bureau of Entomology, United States Department of Agriculture, that the members of the association have voluntarily agreed to adopt a pink colour for all white arsenates and that all of the materials produced for the coming season will be coloured pink. This colour will be used for calcium arsenate, lead arsenate, and magnesium arsenate, and, except for the stock which is now on hand, these standard insecticides will be coloured pink.

MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The regular monthly meeting of the Montreal Branch was held in the Lyman Room, Redpath Museum, on Saturday, January 22nd.

Mr. George A. Moore gave an address on the biology and systematic position of the family Corixidae (Hemiptera), popularly known as "Water Boatmen." The chief points discussed were the adaption to an aquatic environment, the secondary sexual characters, and the stridulatory organs. The talk was illustrated by drawings and by specimens from both Canada and Great Britain, including a series of the species found in the Province of Quebec. The ensuing discussion centered around the question of adaptations.

Mailed Saturday, April 2nd, 1938.